OUR BODY

A WONDERFUL MACHINE

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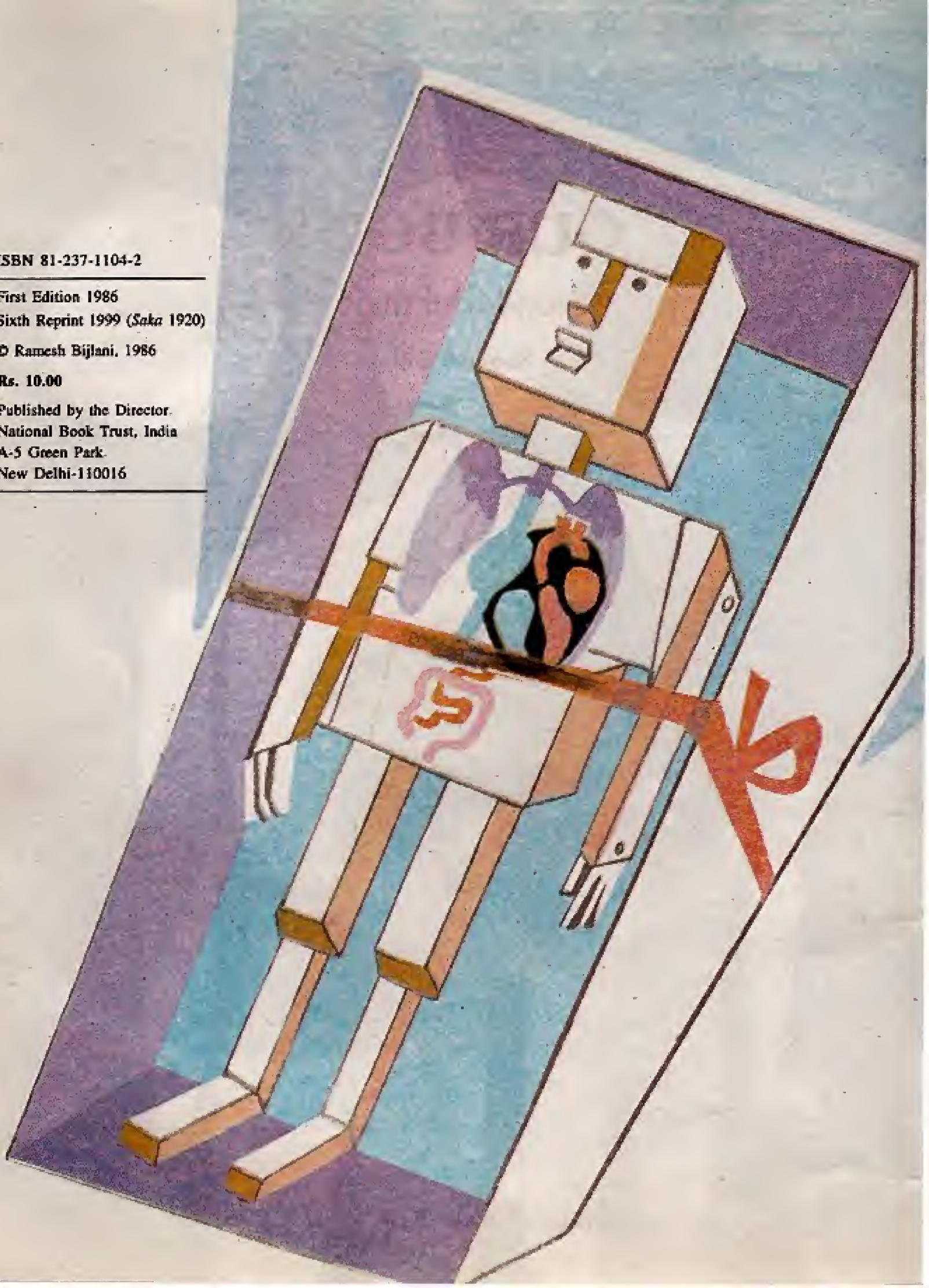

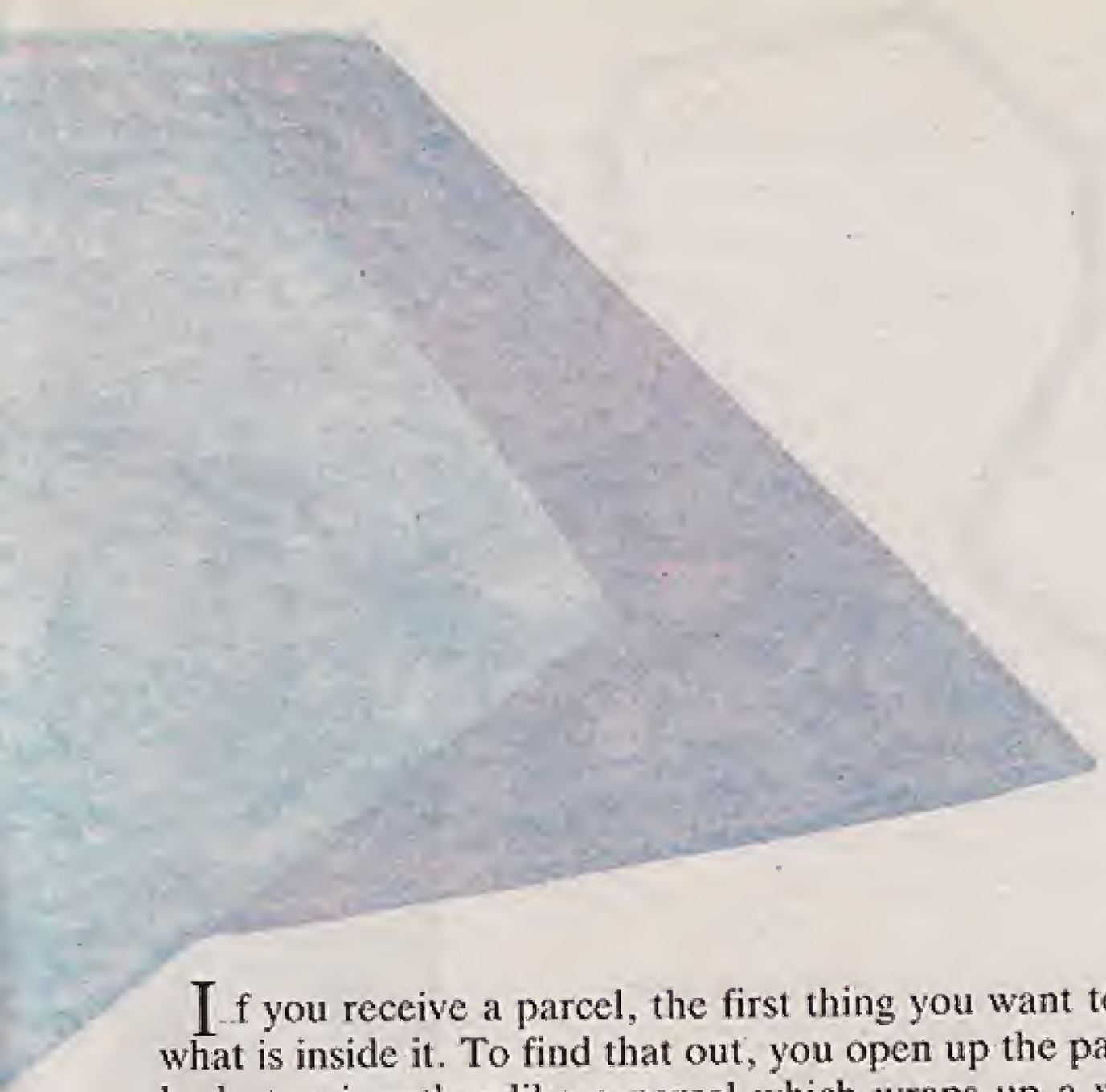

If you receive a parcel, the first thing you want to know is what is inside it. To find that out, you open up the parcel. Our body too is rather like a parcel which wraps up a wonderful machine. You may like to know what the machine looks like, and how it works. This book will tell you something about it.

Before this book was written, or any other such book was written, how did we get to know what you will soon learn from this book? *By asking questions.* Questions lead to answers. Answers are what knowledge is made up of. Thus asking questions has taught us all that we know.

In this book, you will find answers to some of your questions about the way the body works. But there is no end to questions. Do ask more questions as you read along, and try to find the answers. You may fear that your questions are very silly. Never mind, any question is better than no questions at all!

The body works somewhat like an engine. An engine needs coal, which it burns to produce energy. It then uses the energy to run around. Burning also produces waste in the form of smoke, which the engine throws into the air.

Similarly our body needs food, which we burn to produce energy. We then use the energy to run around. Burning also produces waste products, which our body throws out. But we are better than an engine. We burn our food without getting hot.

We eat food so that we have the energy to run around, and also in order to grow up. Our food is wheat, rice, *dal* and milk. But it looks very different from our body — our arms or legs. How, then, does this food end up as our arms and legs? If we break down our food into the tiniest bits, we get a few different kinds of substances. These substances are of the same type that make up our body. What we have to do, therefore, is to break down our food into tiny bits, and rearrange the bits differently to make them look like our body.

Where is the food that we eat broken down into its tiniest bits? This is done in the stomach and intestines. This is what is known as digestion. After being broken down, the bits are passed on to the blood. The blood carries these bits to different parts of the body. Some of the bits are burnt to get energy, others are rearranged to make parts of our body so that we can grow, and we can repair the damaged parts of the body. Our diet, therefore, should have foods which can do both these things. Such a diet is made up of wheat, rice, *dals*, green vegetables and milk. Not only should we take all these things, we should take enough of them everyday. From them our body will get everything that it needs. It will get what it needs for giving us energy. And, it will also get what it needs for making us grow.

The bits of food also need a gas, oxygen, to be burnt completely to produce energy. Oxygen is in the air we breathe in. Notice that you push out your chest as you breathe in. Pushing out of the chest helps send some air to the lungs. In the lungs the air passes on a part of its oxygen to the blood.

The air that we breathe in is generally not clean. Smoke from factories, smoke from kitchens, and smoke from cars and buses spoils the air. But the air that our lungs get should be clean. Air that reaches the lungs, first passes through the nose. The nose has hair, which act like a sieve. They cleanse the air before letting it go to the lungs. The mouth has no hair, and therefore cannot clean the air. So, if we breathe through the mouth, we send dirty air to the lungs. This is not good. So, remember to keep your mouth closed, except when you talk or eat or have a cold.

You not only breathe in, you also breathe out. (Place a finger close to the nostrils for a short while to make sure.) The air that enters the lungs passes on some of its oxygen to the blood, and the blood passes on some of its carbon dioxide to it. Therefore the air that is breathed in has more oxygen and less carbon dioxide than the air that is breathed out. Carbon dioxide is a waste product produced by the burning of food. Thus the lungs help us carry oxygen into the body when we breathe in, and they help us carry carbon dioxide out of the body when we breathe out.


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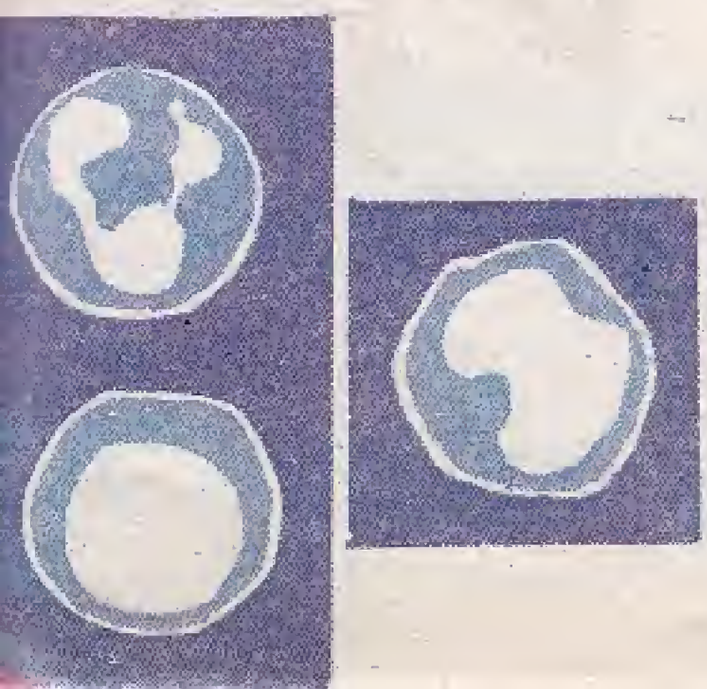
The intestines pass on digested food to the blood. The lungs pass on oxygen to the blood. Blood goes to all parts of the body. Thus blood carries food and oxygen to all parts of the body. Blood also picks up carbon dioxide and other waste products from different parts of the body. You may be feeling that blood is something very important. You are absolutely right; blood *is* essential for life. It carries food and oxygen, which sustain life, to different parts of the body. It removes waste products, which threaten life, from different parts of the body. It also carries several other substances. Carrying things around from one part of the body to another is an important function of blood. Blood is the transport system of the body.

Although blood appears to be a fluid, it has millions of particles in it. These particles can be seen by looking at a drop of blood under a microscope. The particles, called cells, are of two types: one type is red, the other is white.

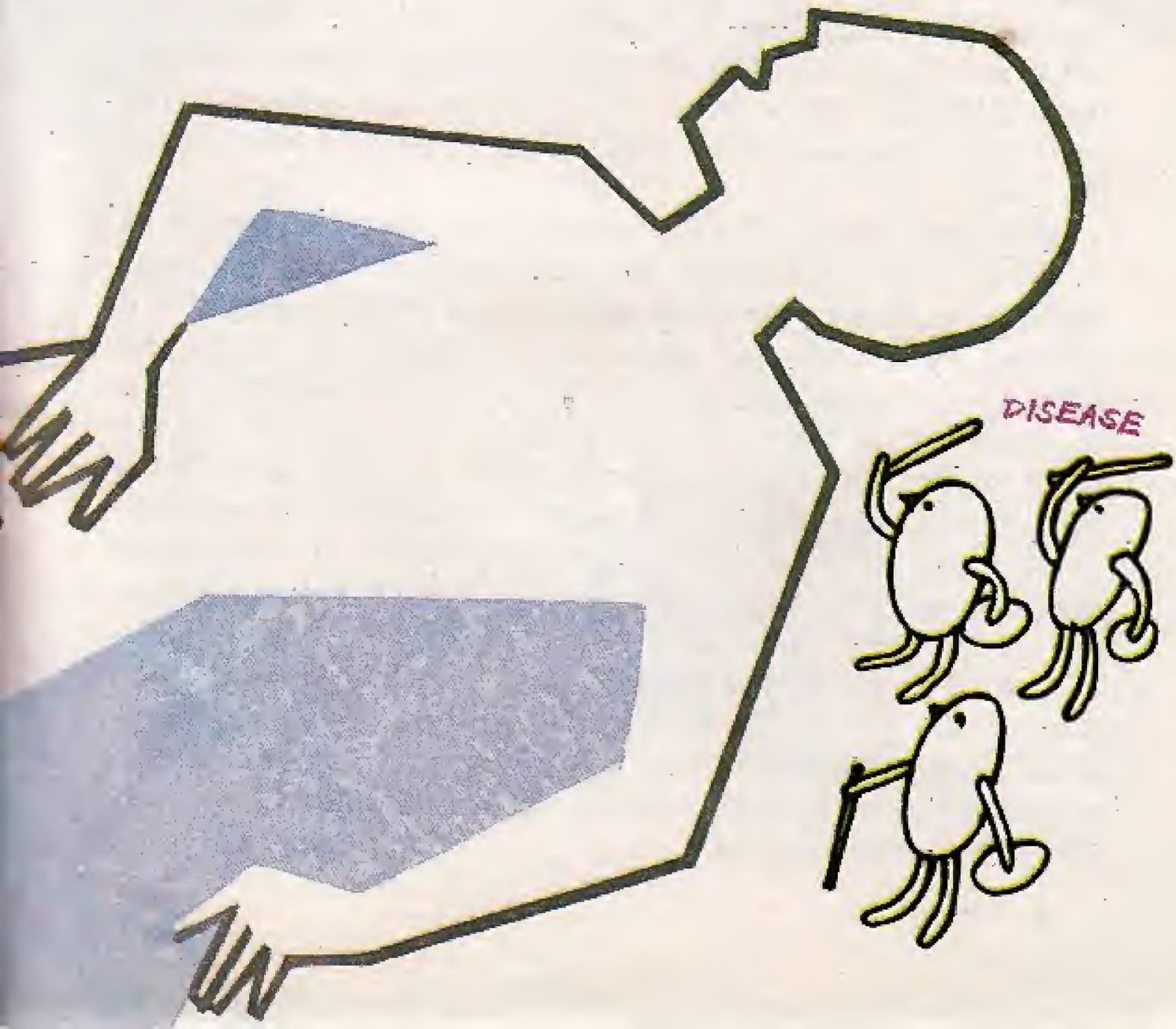


Most of the cells in blood are red blood cells. Just two drops of blood have as many red cells as the population of India. Blood is red because it contains these cells. Red blood cells carry almost all the oxygen present in the blood.

White blood cells defend the body from disease. There are so many germs around us that it is impossible to escape from them, however hard we try. When they enter the body, the white blood cells fight them, and usually overpower them. Occasionally, however, the white cells get overpowered. Then

we fall ill. But even then the white cells keep on the battle, and generally win in the end. Then we get well. Thus blood is not just a transport vehicle, it is also an army always on the move.

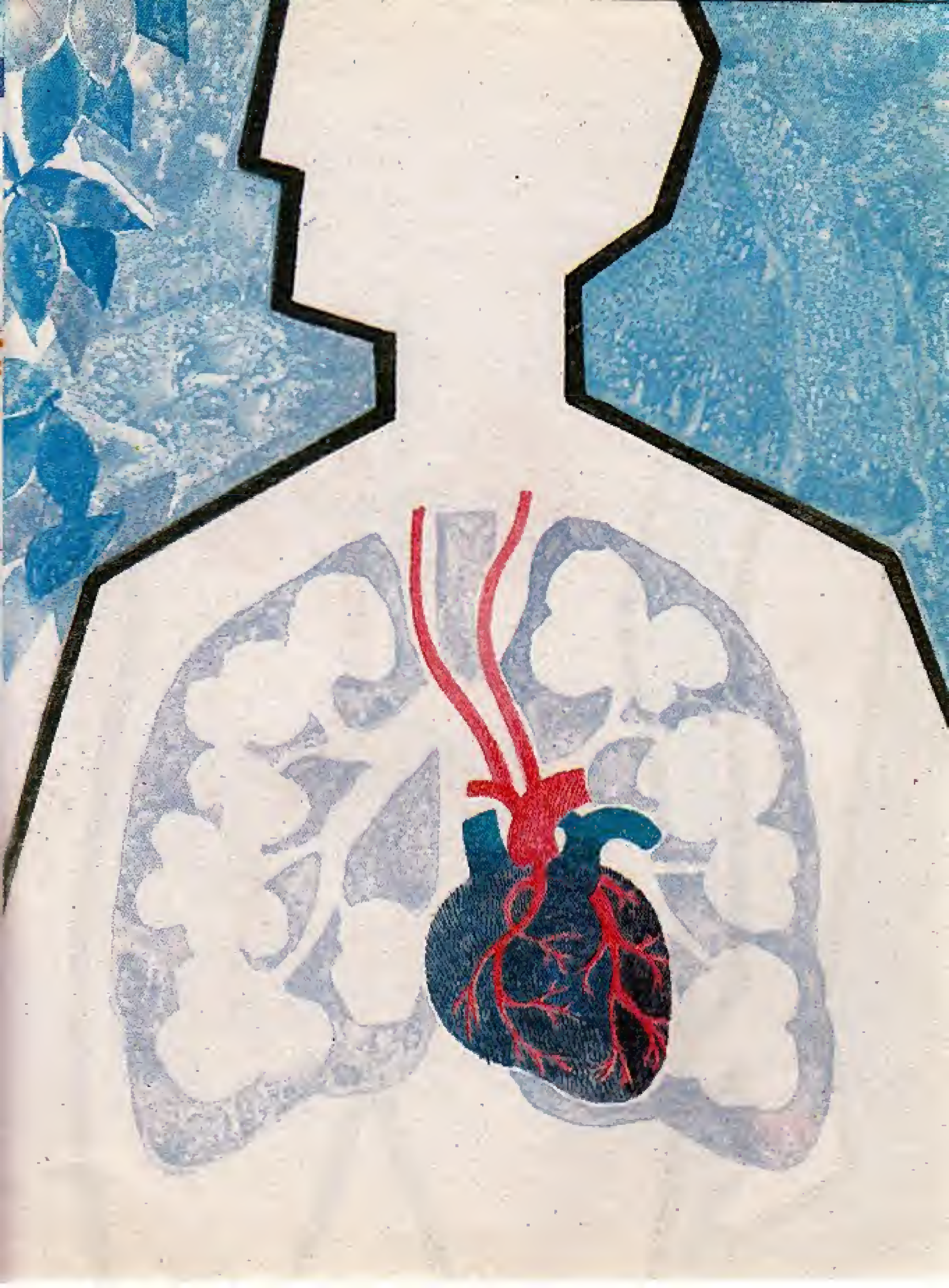
Blood is a delivery van: it delivers food and oxygen to all parts of the body. Blood is a pick-up van: it picks up waste from all parts of the body. Blood is a mobile army: it drops soldiers wherever needed. In short, blood is always moving, or flowing. Do you know what moves the blood?

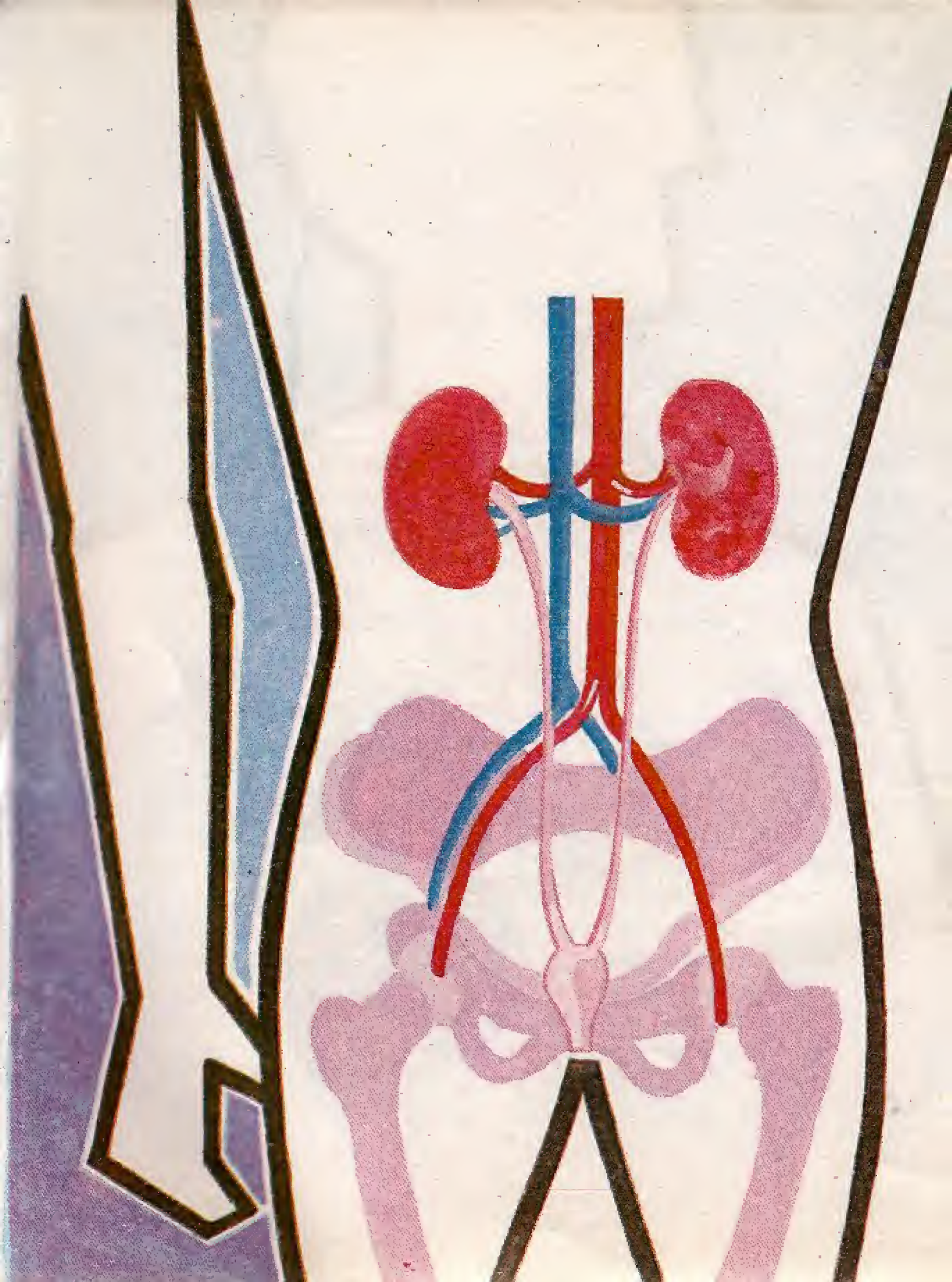


The force for the movement of blood comes from a wonderful pump, the heart. The right side of the heart and the left side of the heart act like two pumps. The right side pumps blood to the lungs. This blood then goes from the lungs to the left side of the heart. The left side of the heart pumps blood to the whole body. Blood from all parts of the body returns to the right side of the heart to be pumped again into the lungs. Thus the cycle goes on.

The blood pumped by the left side of the heart to all parts of the body is the blood that has just returned from the lungs where it gained oxygen and lost carbon dioxide. The blood pumped by the left side of the heart delivers oxygen to and picks up carbon dioxide from different parts of the body. Then it returns to the right side of the heart. The right side of the heart pumps blood to the lungs where it gains some fresh oxygen, and loses some carbon dioxide. Thus the cycle goes on.

If all of us keep using the oxygen in the air, and keep dumping carbon dioxide into it, won't we one day use up all the oxygen in the air, and fill it up with carbon dioxide instead? In fact, that would have happened long ago, but for our green friends, the plants. These friends use up carbon dioxide to make their food, and release oxygen into the air. We use up oxygen to burn food, and release carbon dioxide into the air. Thus the cycle goes on.





The body also produces waste products other than carbon dioxide. These are removed from the body by the kidneys. Each of us has two kidneys. Kidneys are bean shaped, and are placed in the tummy towards the back.

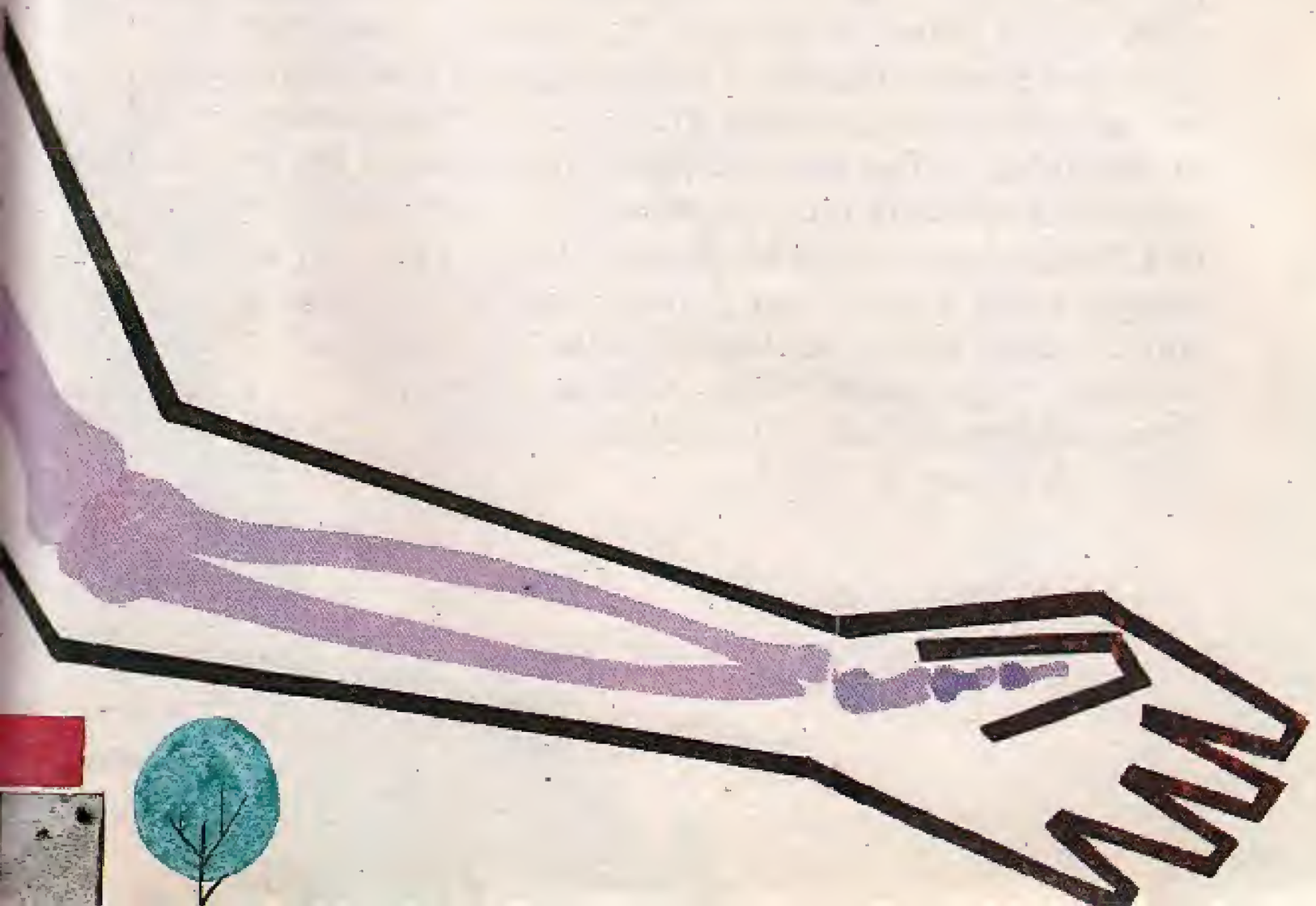
The kidneys clear the body of unwanted substances in much the same way as you would clear a dirty cupboard. You would first remove from it everything it contains. Then you would place back the things you want to keep, and throw the unwanted things into the dustbin. Similarly, the kidneys first filter the blood. The filtered blood contains almost everything except the blood cells. It contains unwanted as well as wanted things. The kidneys return the wanted things to the blood, and the unwanted products are left behind to be removed as urine.

We have now had a quick look inside the parcel to which we compared our body at the beginning. But what about the wrapper which packs the parcel?

The wrapper which packs our body is the skin. The skin is not just a covering. It saves us from heat and cold, pins and thorns. Moreover, it can heal itself. If there is a cut or a burn in the skin, it takes just a few days for the skin to be as good as new again.

The skin also helps in keeping the body cool in summer and warm in winter. If you go out on a hot summer day, you sweat. Sweating makes the body wet. As the wetness dries up, it cools the body. Skin reacts to heat by sweating, and it reacts to cold by not sweating. Thus the skin helps keep the inside of the body always at the right temperature. That is why, if you take your temperature on a thermometer, it is the same in the burning heat of summer as well as in the bitter cold of winter.

Now let us look at the structures that hold the body together, the bones. Bones are the framework of the body. If there were no bones, we would be soft and shapeless like a heap of *halwa*. Bones are made in much the same way as the roof of a house. The roof has a network of iron rods, which can stand a lot of pulling and bending, and a filling of extremely hard concrete. Bones can also stand a lot of pulling and bending, and are extremely hard. But bones are much better than the roof. Unlike the roof, bones grow as a child turns into a grown-up. They change constantly to stand better the burden of our weight and movements. And, if you break a bone, it will repair itself in a few weeks.



Although our body resembles an engine, it is much better than an engine. For example, our body has means of knowing and learning. We learnt earlier that the skin tells us how hot or cold, sharp or blunt, hard or soft something we touch is. This happens because the skin sends messages to the brain about the type of thing we are touching. Organs like the skin which help us know something about the world around us are called sense organs.

The eyes are an important sense organ. An eye is ball shaped, and has three main layers. In front is the first layer, which is transparent. Through it, we can see the second layer, which is coloured. It is the colour of this layer that makes a person brown-eyed, blue-eyed, etc. Last of all is the third layer, which is sensitive to light. This layer is connected with the brain.

Light from outside enters the eye through the first transparent layer. The area that admits light is the small black circle in the centre of the eye. This circle is black even in a blue-eyed person. This black circle widens or closes depending on the amount of light falling on the eye. In bright sunlight, it is at its smallest so that too much light does not enter the eye. As you walk into a dark room, it widens to let in more light so that in a few seconds you can see objects clearly. (You can see this happen using a torch and mirror. Darken the room in which you are sitting. See the size of the black circles of your eyes in the mirror. Shine the torch into one of your eyes from the side. You will see the black circles shrinking at once.)

The outermost layer through which light enters the eye acts like a lens and concentrates light. (To see how a lens concentrates light, hold a lens in sunlight. You'll see that light passing through the lens gets focussed to a point.) In the same way, light passing through the eye gets focussed on the third layer of the eye, which acts like a screen. On the screen the light coming from an object forms a pattern similar to the object. This pattern is sent to the brain. That is how we are able to see the object.

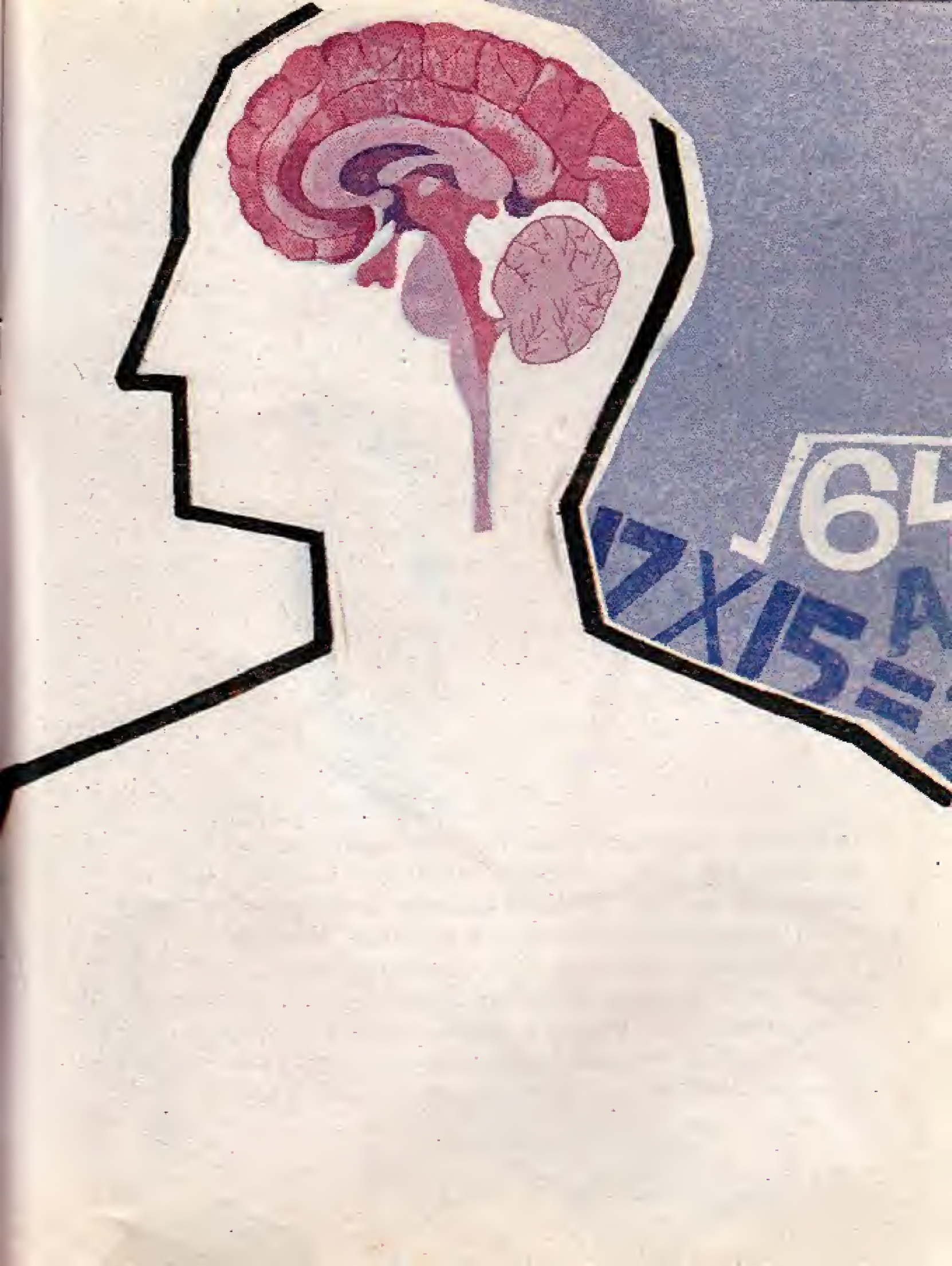
When you are playing outside, and your mother wants you, she calls you. You hear her voice and come running. Thus, hearing is very useful. The part of the ears which we can see is not very important for hearing. It only directs the sound to the ear drum the way a funnel would. On receiving the sound, the ear drum vibrates. These vibrations are passed on to the middle ear, which in turn, passes on the vibrations to the inner ear. The inner ear has the sense organs sensitive to vibration. When these sense organs are made active, they send messages to the brain, and that results in hearing.

Another sense organ is the nose, which helps us smell. It is from the upper part of the nose that we smell. When we breathe normally and quietly, the air generally does not reach the upper part. Therefore, to smell properly, we need to take a sharp, quick breath which draws air right up the nose. This is called sniffing. (Hold a rose close to your nose. See how much better you can smell its scent if you sniff rather than breathe quietly.) Besides being used for smelling, the nose is also used for breathing.

Then there is the tongue that helps us taste. Different tastes are felt best in different parts of the tongue. For example, the sweetness of a sweet is enjoyed most when placed on the tip of the tongue, and the sour taste of *achar* is enjoyed most when licked with the edges of the tongue. On the other hand, a bitter pill is bitterest if it touches the back of the tongue. So, when swallowing a bitter pill, put it straight into the throat, so that it does not touch the tongue at all.

All these sense organs—the skin, eyes, ears, nose and tongue—tell the brain what our surroundings are like. The brain puts together the information and decides what to do. It often asks for action in the form of movement. For example, if you see a house on fire, your brain reacts and you shout, "Fire". You may then run to get a bucket of water. Movements such as these are made possible by muscles. Muscles, in fact, bring about every movement of the body—walking, running, bending, etc.

Muscles are attached to bones, and bring about movement by shortening. We can make a muscle shorten whenever we wish. Sometimes, however, muscles shorten without our wishing. For example, if you step on a thorn, you immediately jump back before you can wish anything. An action like this which does not need thinking is called a reflex action. Reflex actions protect us from hurting ourselves; in this case, the reflex action may save you from the thorn getting deep into your foot. But after the reflex action, it is good to think. In the above case, if you think a while, you would look for the thorn and remove it to a safe place, so that neither you nor anybody else steps on it after that. It is always good to think. Thinking is a function of the brain.

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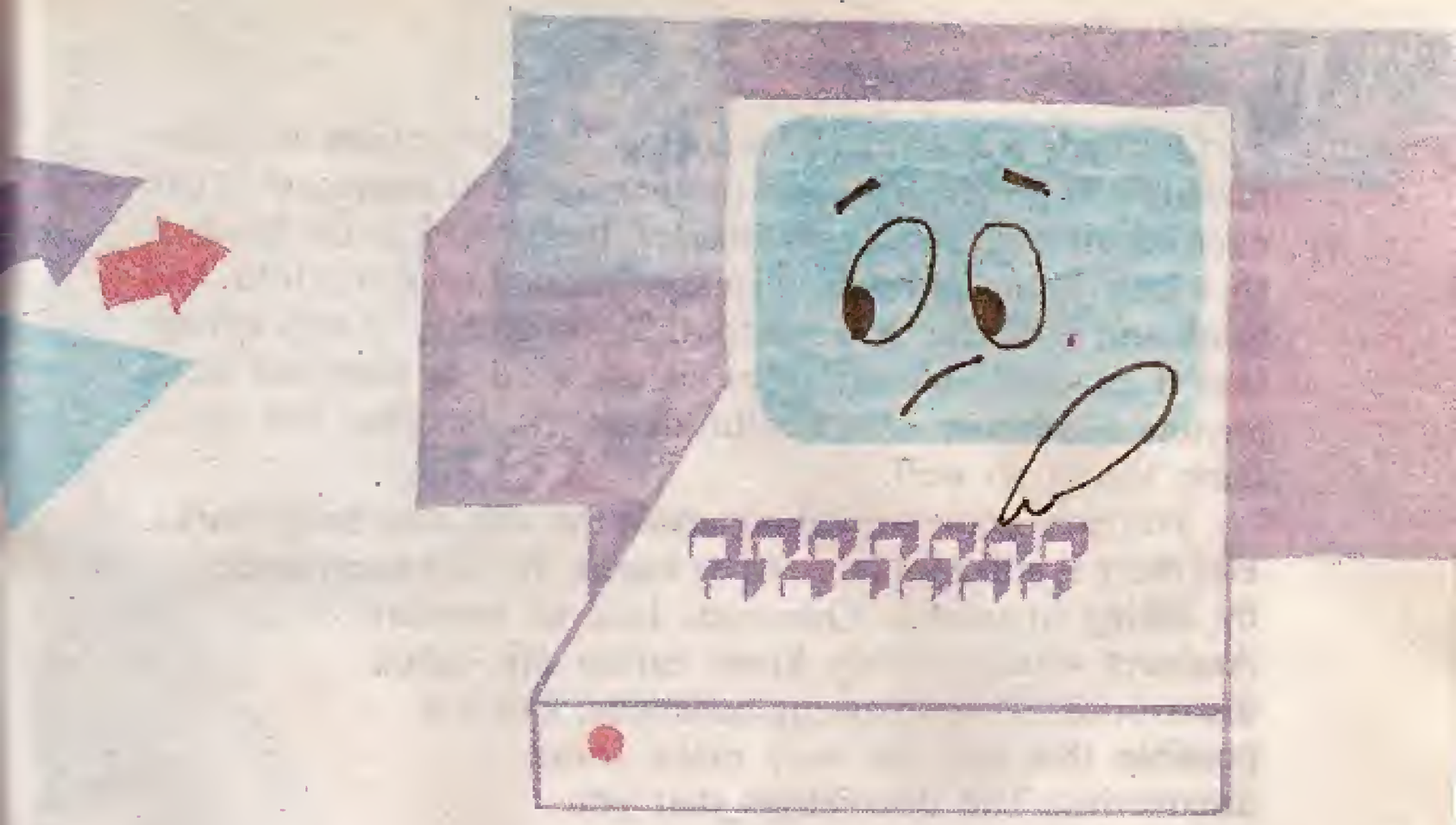
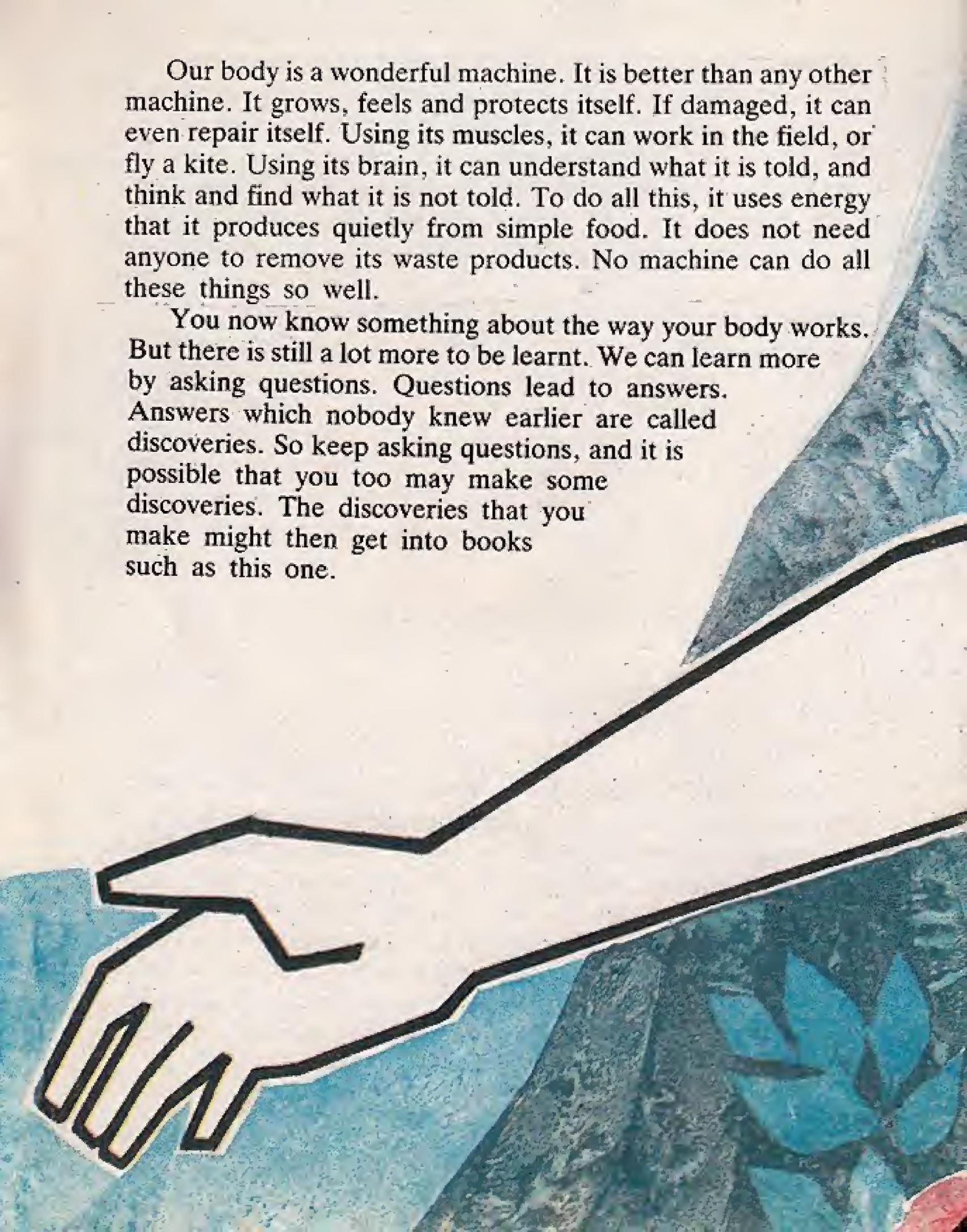


Our brain is perhaps our most marvellous organ. It is due to our brain that we can think, remember, feel and learn. A computer can do what man has taught it, and can do it faster than man himself. Although a computer can remember to do what it has been taught by man, it cannot think, feel or learn. It cannot solve a problem that it has not been taught. Man's brain can grasp a new problem, react to it sensibly, and often solve it. Animals also have brains but human beings can think and learn better than any animal because man has the best brain.

Our body is a wonderful machine. It is better than any other machine. It grows, feels and protects itself. If damaged, it can even repair itself. Using its muscles, it can work in the field, or fly a kite. Using its brain, it can understand what it is told, and think and find what it is not told. To do all this, it uses energy that it produces quietly from simple food. It does not need anyone to remove its waste products. No machine can do all these things so well.

You now know something about the way your body works. But there is still a lot more to be learnt. We can learn more by asking questions. Questions lead to answers. Answers which nobody knew earlier are called discoveries. So keep asking questions, and it is possible that you too may make some discoveries. The discoveries that you make might then get into books such as this one.



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